Introduction

References and Presentation at:
http://www.elinux.org/SOC_Spies

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- Dave Anders aka prpplague

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- Double-Agent Developer: ARM vs. X86

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    - NOT Flame Fest

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  - NOT representing any company or organization

  - NOT promoting one architecture over another

Introduction

- Dave Anders aka prpplague

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- Double-Agent Developer: ARM vs. X86
  - Historical Perspective

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    - Historical Perspective
    - General Pros/Cons

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- Double-Agent Developer: ARM vs. X86

  - Historical Perspective

  - General Pros/Cons

  - Practical Considerations

Historical Perspective

- Embedded in 1999

Historical Perspective

- Embedded in 1999
  - Geode
  - STPC
  - i486

Historical Perspective

- Embedded in 1999

- TCS-X1

Historical Perspective

- Embedded in 1999

- TCS-X1

- ITSY

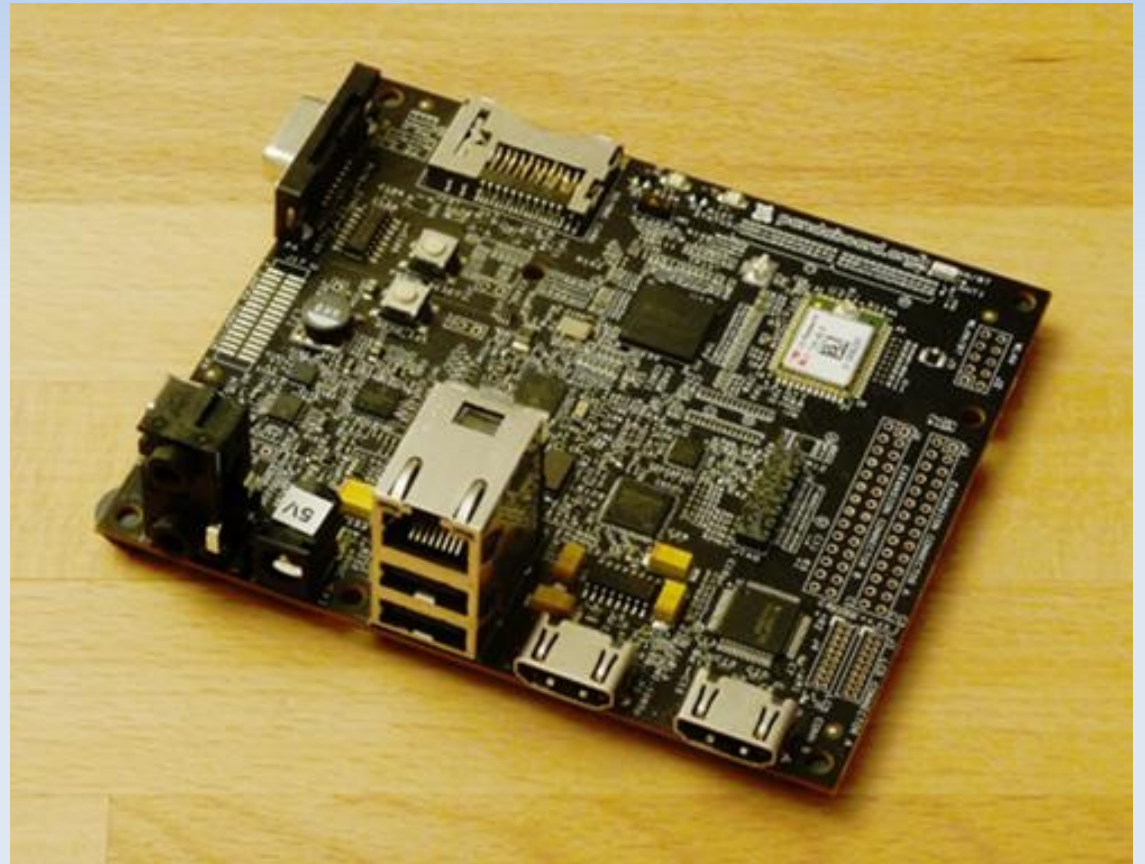# Historical Perspective

- Embedded in 1999

- TCS-X1

- ITSY

  - Design Files
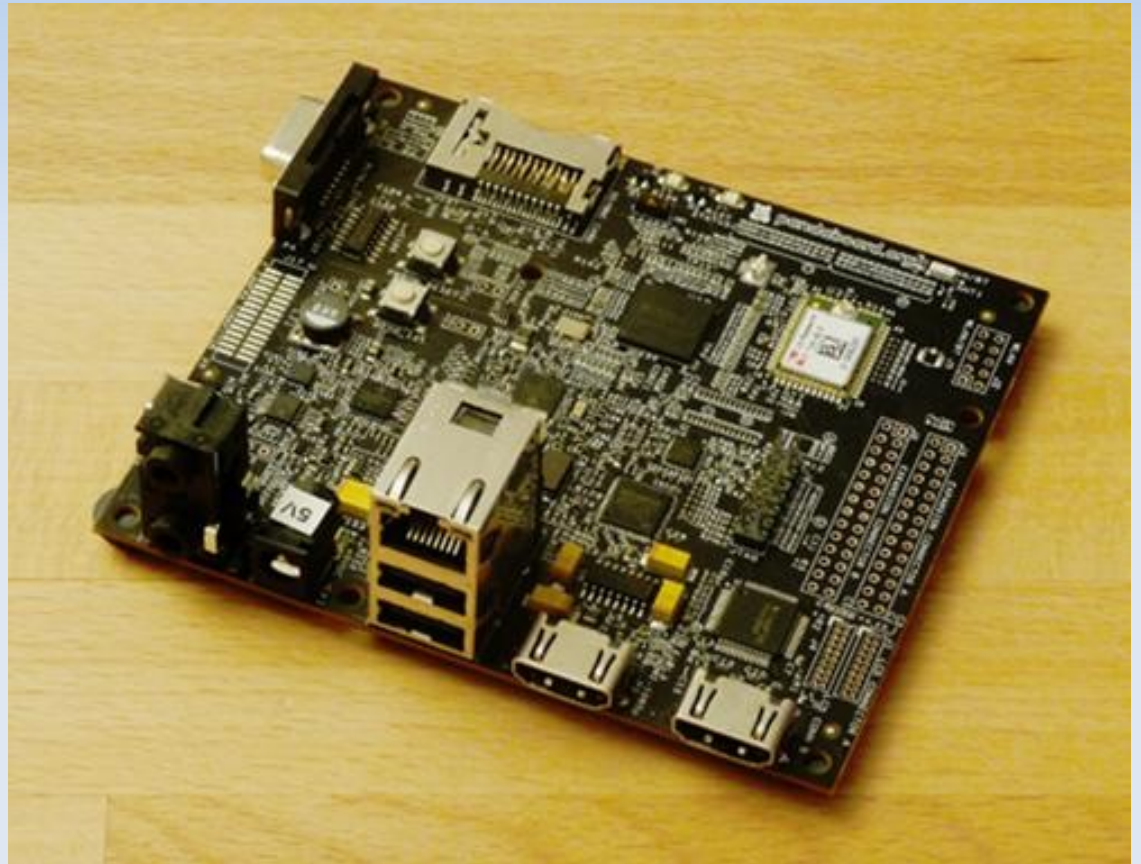
  - Linux Support

  - ARM Based

Historical Perspective

- Embedded in 1999

- TCS-X1
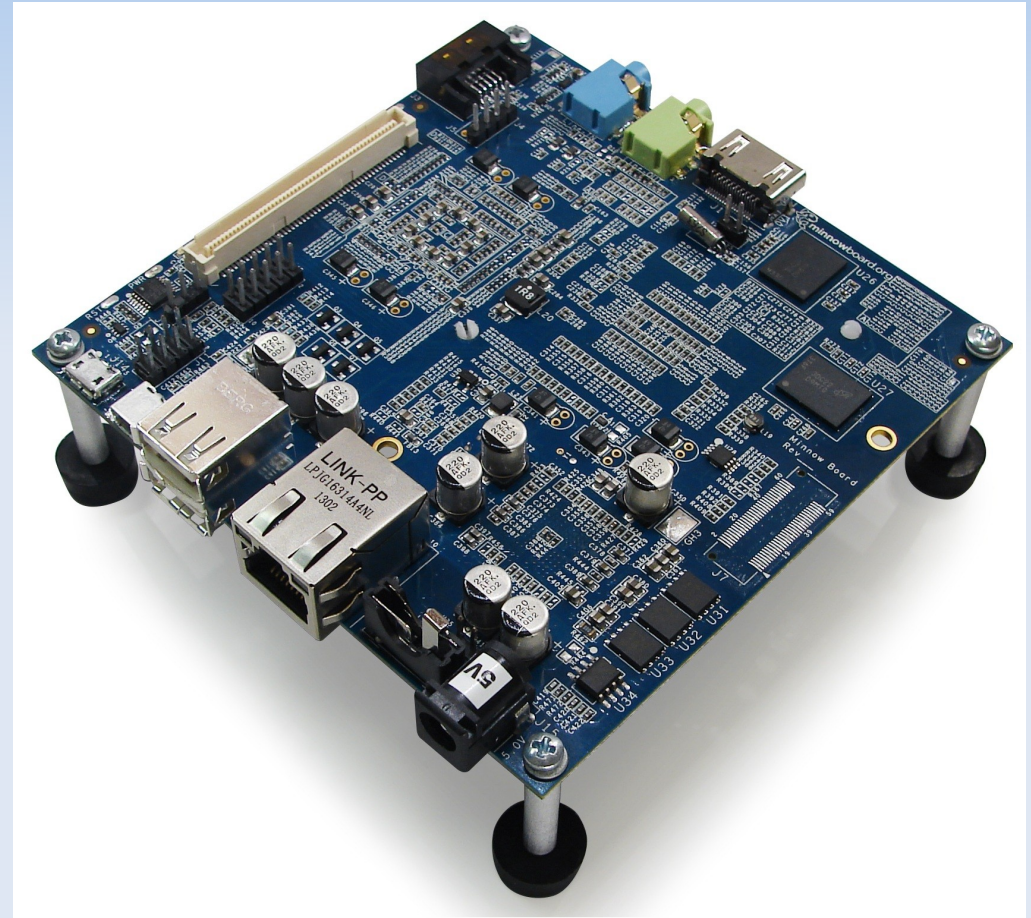
- ITSY

- PandaBoard

Historical Perspective

- Embedded in 1999

- TCS-X1

- ITSY

- PandaBoard

  - Design Files

  - Linux Support

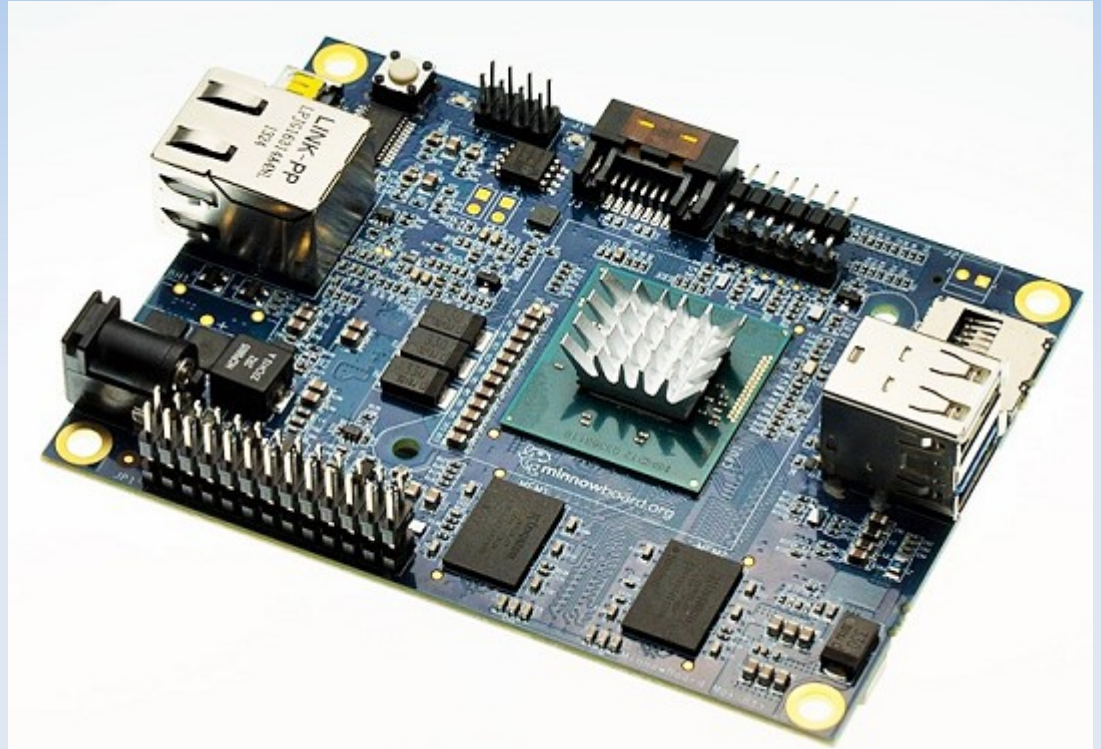 - ARM Based

Historical Perspective

- Embedded in 1999
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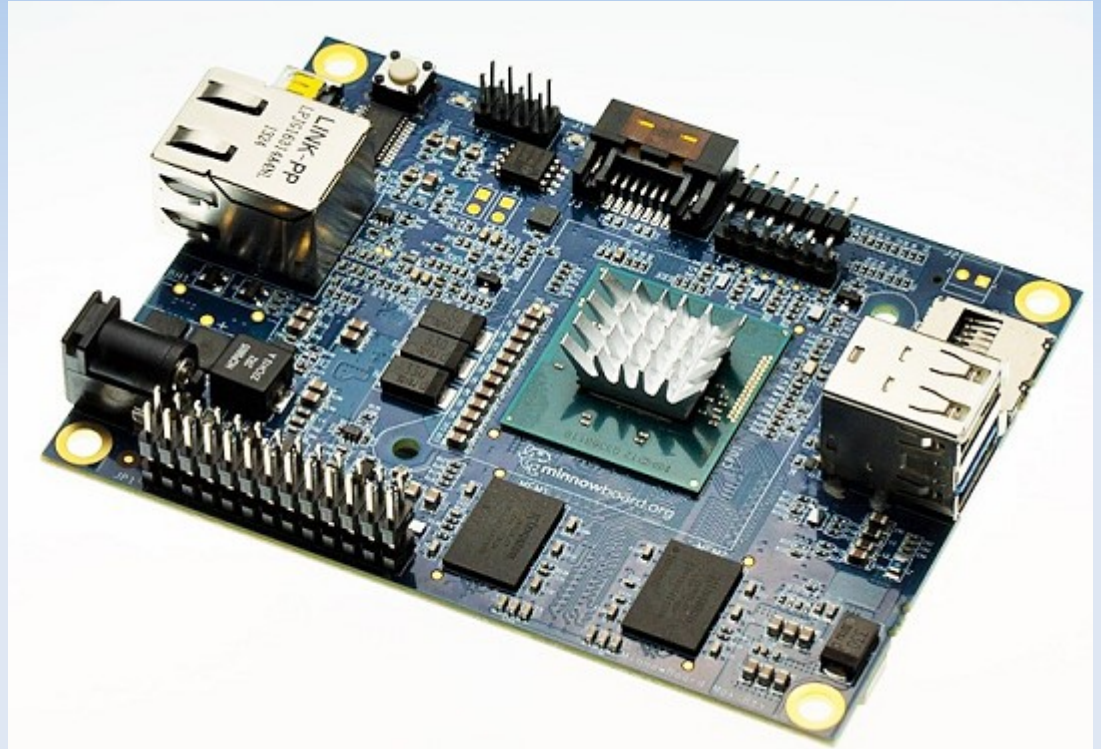- PandaBoard
- MinnowBoard
  - Intel x86???

Historical Perspective

- Embedded in 1999

- TCS-X1

- ITSY

- PandaBoard

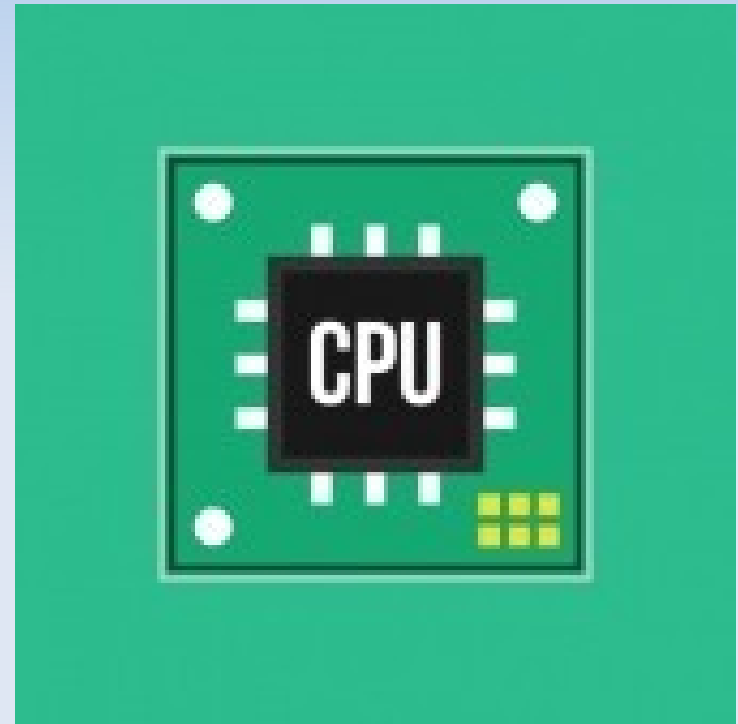- MinnowBoard

- MinnowBoard Max

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- PandaBoard

- MinnowBoard

- MinnowBoard Max
  - Design Files
  - Linux Support
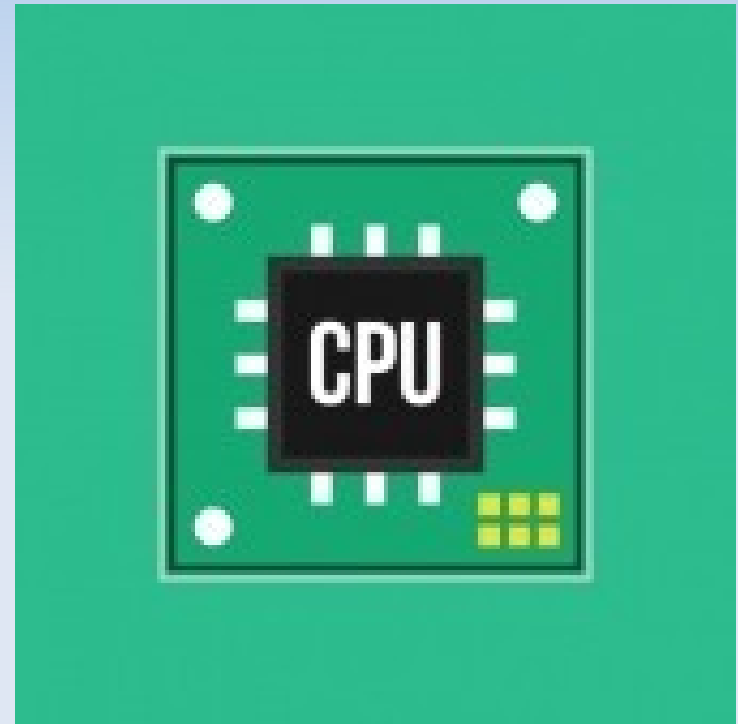 - IA 64-bit

Historical Perspective

- Embedded in 1999

- TCS-X1

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- PandaBoard

- MinnowBoard

- MinnowBoard Max

- X86 and ARM Designs

Historical Perspective

- Embedded in 1999

- TCS-X1

- ITSY

- PandaBoard

- MinnowBoard

- MinnowBoard Max

- X86 and ARM Designs

Experiences and opinions represented here are from my personal perspective of creating open source hardware designs that first and foremost run Linux

General Pros/Cons

- x86 Pros

General Pros/Cons

- x86 Pros – Uniformity

General Pros/Cons

- x86 Pros – Uniformity
  - Decades spent working on uniformity

General Pros/Cons

- x86 Pros – Uniformity
  - Decades spent working on uniformity
  - Component Vendor infrastructure

General Pros/Cons

- x86 Pros – Uniformity
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  - Reference Designs

General Pros/Cons

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  - Reference Designs #exactsteps

General Pros/Cons

- x86 Pros – Uniformity

    - Decades spent working on uniformity

    - Component Vendor infrastructure

    - Reference Designs #exactsteps

Here is a reference design,
if you use it *exactly* as given,
it will work!

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

  - No one enforcing compatibility

General Pros/Cons

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  - Open Vendor interaction

General Pros/Cons

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General Pros/Cons

- x86 Pros – Uniformity

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  - Reference Designs #rtfm

General Pros/Cons

- x86 Pros – Uniformity

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  - Open Vendor interaction

  - Reference Designs #rtfm

  Here is a reference design with one example of implementation and if you change it, you better check the datasheet!

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

The things that provide the greatest strengths for both ARM and x86 are also their greatest weaknesses

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

    - Rigid adhearance standards

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

  - Rigid adhearance standards

  - Lack of Vendor interaction

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

  - Rigid adhearance standards

  - Lack of Vendor interaction

  - Lack of Design variations

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

General Pros/Cons

- x86 Pros – Uniformity

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General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

    - Lack of standards enforcement

    - Lack of vendor compliance

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

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- ARM Cons

  - Lack of standards enforcement

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General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

- Pathway Forward

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

- Pathway Forward

    - x86 → embedded

    - ARM → server

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

- Pathway Forward

  - x86 → embedded – relaxing standards - easy

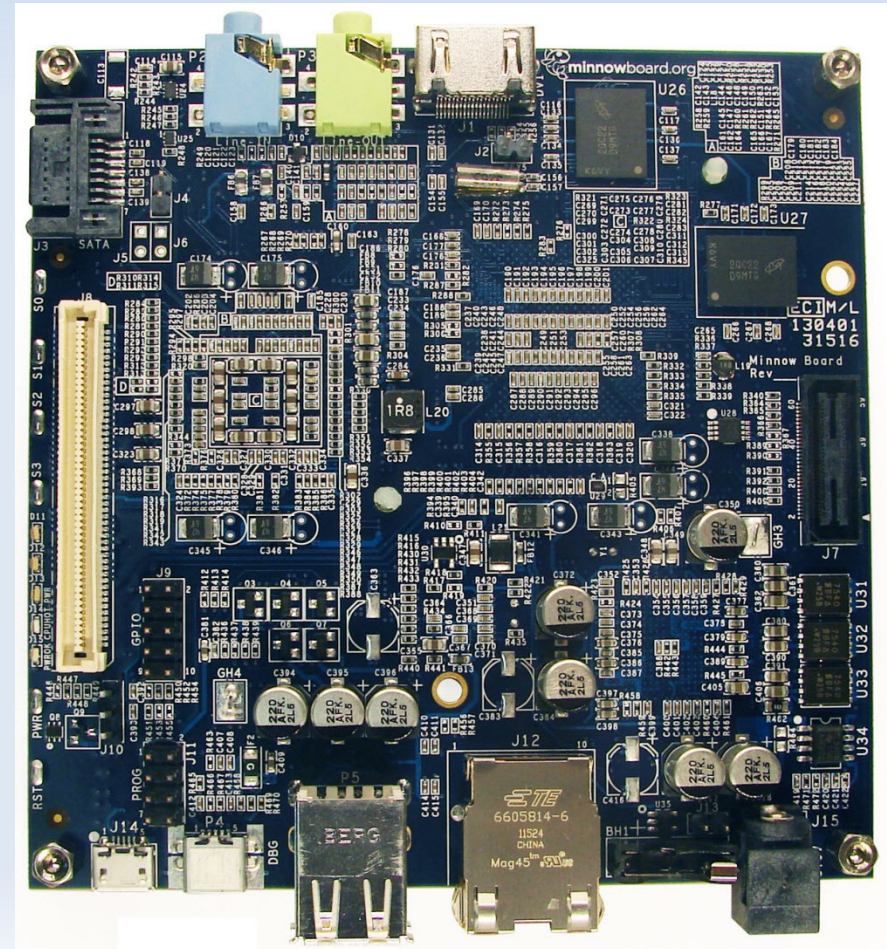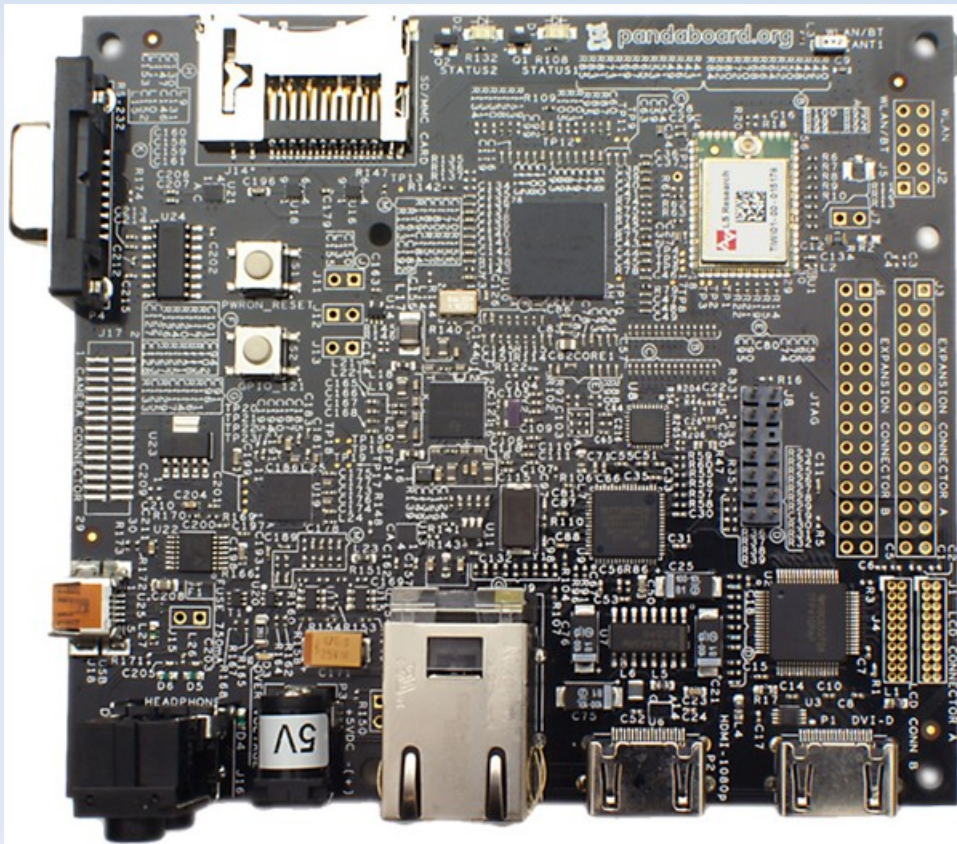 - ARM → server

General Pros/Cons

- x86 Pros – Uniformity

- ARM Pros – Flexibility

- x86 Cons

- ARM Cons

- Pathway Forward

  - x86 → embedded – relaxing standards - easy
  - ARM → server – enforcing standards - hard

Practical Considerations
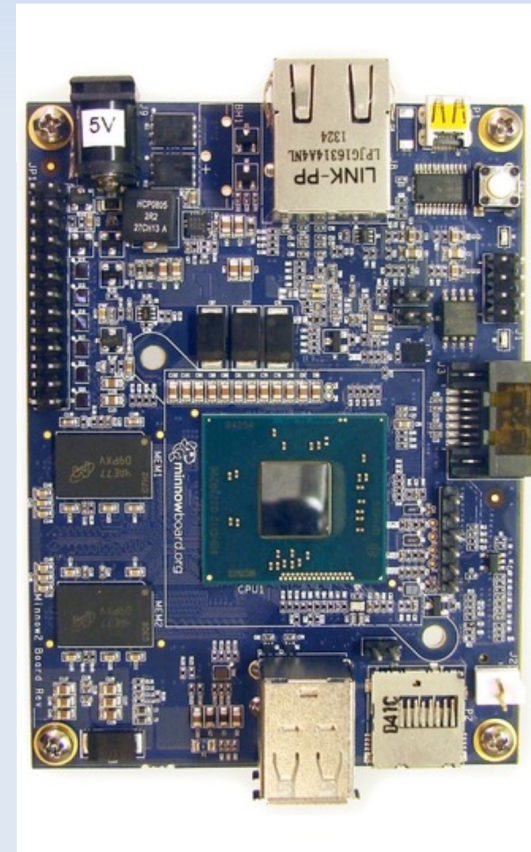
- Hardware

Practical Considerations

- Hardware
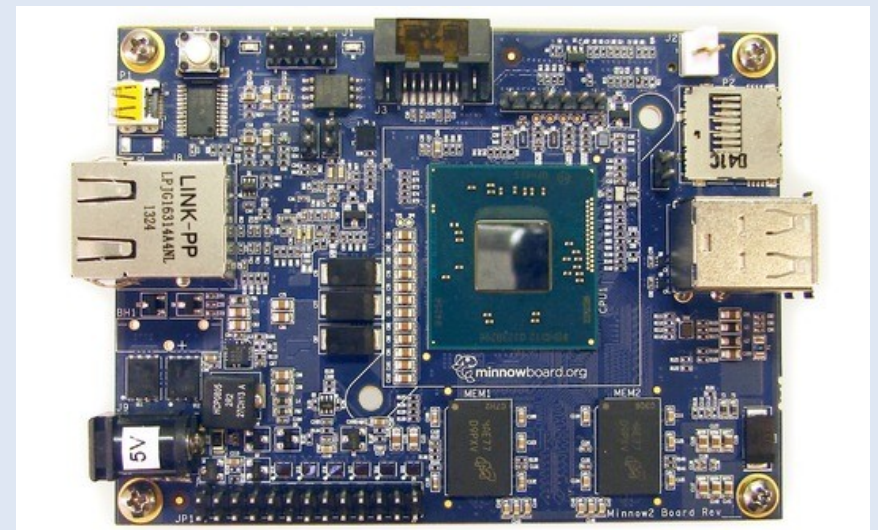 - Component Count (Pro-Arm/Con-x86)
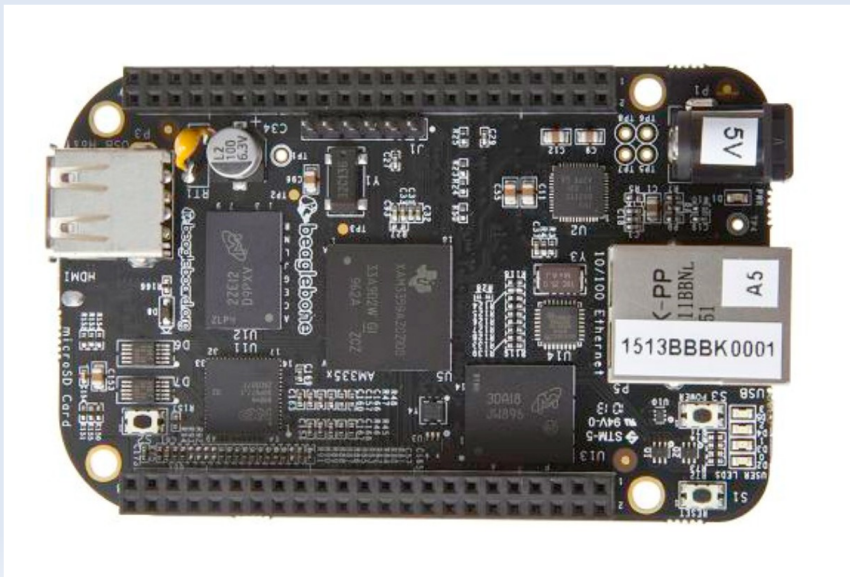
Practical Considerations

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Practical Considerations
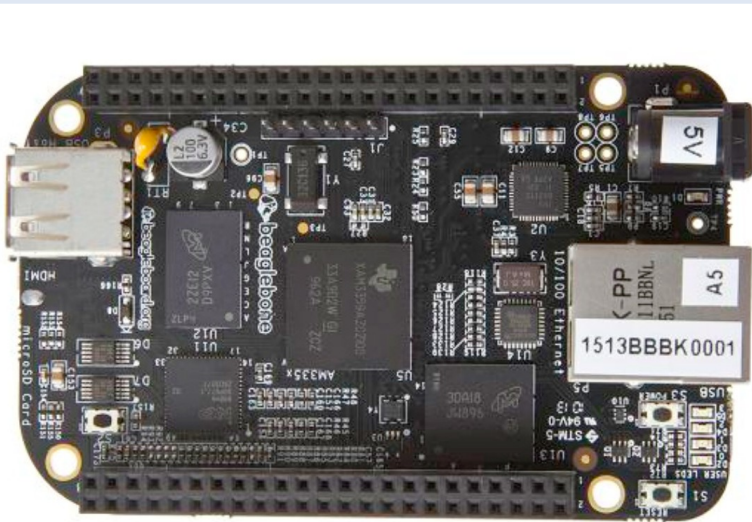
- Hardware
  - Component Count (Pro-Arm/Con-x86)

BeagleBone Black
18 Unique Values
131 Total Resisors

Practical Considerations

- Hardware
  - Component Count (Pro-Arm/Con-x86)

BeagleBone Black
18 Unique Values
131 Total Resisors

MinnowBoard Max
73 Unique Values
322 Total Resisors
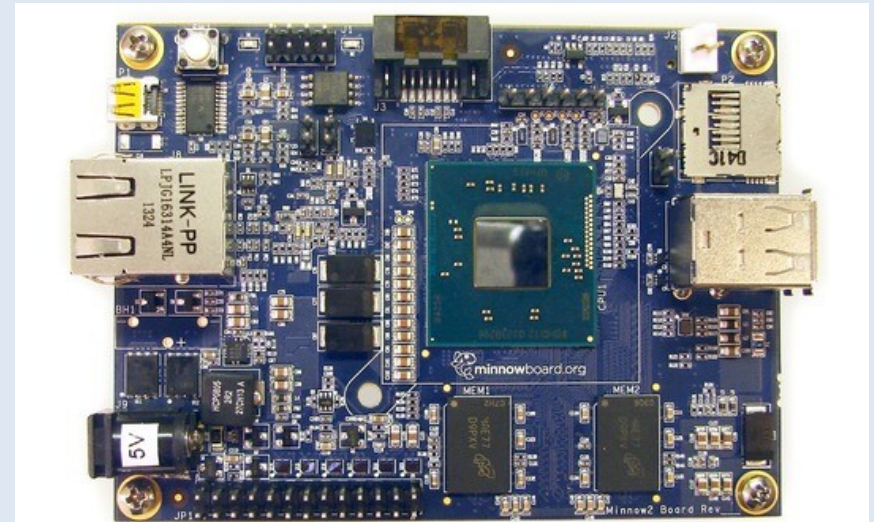
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- Hardware
  - Component Count (Pro-Arm/Con-x86)
  - Power Supplies (Pro-x86/Con-ARM)

Practical Considerations

- Hardware

  - Component Count (Pro-Arm/Con-x86)

  - Power Supplies (Pro-x86/Con-ARM)

    - Use without dedicated PMIC

    - Robust fault tolerance

    - Wide component selection

Practical Considerations

- Hardware

  - Component Count (Pro-Arm/Con-x86)

  - Power Supplies (Pro-x86/Con-ARM)

  - Peripherals (Pro-ARM/Con-x86)

Practical Considerations

- Hardware

  - Component Count (Pro-Arm/Con-x86)

  - Power Supplies (Pro-x86/Con-ARM)

  - Peripherals (Pro-ARM/Con-x86)

    - Limited component selection
    - Gige PHY on MinnowBoard
    - Codec on MinnowBoard

Practical Considerations

- Hardware
  - Component Count (Pro-Arm/Con-x86)
  - Power Supplies (Pro-x86/Con-ARM)
  - Peripherals (Pro-ARM/Con-x86)
  - Peripherals (Pro-x86/Con-ARM)

Practical Considerations

- Hardware

  - Component Count (Pro-Arm/Con-x86)

  - Power Supplies (Pro-x86/Con-ARM)

  - Peripherals (Pro-ARM/Con-x86)

  - Peripherals (Pro-x86/Con-ARM)

        - Too many options

        - Lack of example configurations

        - Design for least common denominator

        - USB PHY on PandaBoard

Practical Considerations

- Hardware

- Software

Practical Considerations

- Hardware

- Software

    - Cross/Native Compile

Practical Considerations

- Hardware

- Software

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  - PinMuxing

    - Device Tree Overlays (Pantelis Antoniou)

Practical Considerations

- Hardware

- Software

  - Cross/Native Compile

  - PinMuxing

        - Device Tree Overlays (Pantelis Antoniou)
        - ACPI with SSDT (Rafael Wysocki)

Practical Considerations

- Hardware

- Software

  - Cross/Native Compile

  - PinMuxing

      - Device Tree Overlays (Pantelis Antoniou)
      - ACPI with SSDT (Rafael Wysocki)
      - ACPI on ARM (Graeme Gregory)

Practical Considerations

- Hardware

- Software

    - Cross/Native Compile

    - PinMuxing

    - Mainline Linux Support

Practical Considerations

- Hardware

- Software

  - Cross/Native Compile

  - PinMuxing

  - Mainline Linux Support

            - Evil Vendor Trees

            - Distribution Selection

Conclusion

- Historical Perspective

- Generals Pros/Cons

- Practical Considerations

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- Use the Arch that makes the most sense

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- Use the Arch that makes the most sense

- ARM and x86 have a common enemy

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SYSTEMD

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Questions?

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